Dead Laundry Project
Fisheries Specialist Report

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Contents

Introduction

This report describes the baseline condition and potential effects of the alternatives to selected aquatic organisms and their habitat.

Relevant Laws, Regulations, and Policy

Regulatory Framework

Clearwater Forest Plan

The Dead Laundry project is designed to comply with the Forest Plan (CNF 1987). The Forest Plan was based on the requirements of the National Forest Management Act (NFMA) of 1976, and the NFMA implementing regulations found at 36 CFR 219. Forest Plan goals that relate specifically to the proposed project include:

- Manage the Forest's fishery streams to achieve optimum levels of fish production by: 1) maintaining high quality habitat in existing high quality streams, and 2) rehabilitating and improving degraded streams on certain developed portions of the Forest; and then maintaining the optimum levels (II-2).
- Manage habitat to contribute to recovery of each threatened and endangered species occurring on the Forest (II-2).

The Forest Plan was amended in 1995, following a joint decision (commonly called INFISH- Inland Native Fish Strategy) by the U.S. Forest Service and Bureau of Land Management for managing resident fish-producing watersheds on Federal lands, including streams within the project area. The standards and guides from INFISH would be applied to the project.

The interim direction provided by INFISH identifies and defines Riparian Habitat Conservation Areas (RHCAs), establishes Riparian Management Objectives (RMOs), and applies standards and guidelines to RHCAs to meet the RMOs. RHCAs include those areas within 300 feet of fish bearing streams, within 150 feet of non-fish bearing streams, and 100 feet on intermittent streams and wetlands of 1 acre or less. RHCA widths exceed Idaho state best management practice standards. All management activities must be designed to have no adverse effect to the designated Riparian Management Objectives (RMOs) which are large instream woody material, stream temperature, width to depth ratios, bank stability, and pool frequency.

FSM 2670 directs the Forest Service to conserve threatened and endangered species and to use its authorities in furtherance of the Endangered Species Act (ESA) 1973, and to avoid actions that may cause a species to become threatened or endangered. FSM 2670 also requires the Forest Service to maintain viable populations of all native and desirable non-native fish species in habitats distributed throughout their geographic range of NFS lands. As directed by the ESA, biological assessments and consultation under section 7 of the ESA would be completed for this project if effects to listed species are expected.

Desired Condition

The desired condition for streams are habitats with natural sediment levels and unobstructed access for fish into historic habitats. In addition, a well-maintained road system that is disconnected from stream

networks yet adequate to provide for timber harvest, recreation, fire suppression, and administrative use (i.e. meeting Forest Plan goals and objectives) is also desired.

Federal Law

Endangered Species Act

The US Fish and Wildlife Service (USFWS) lists bull trout as threatened under the ESA (www.fws.gov- July 9, 2018). Consultation with the USFWS is required for projects affecting bull trout. The project would be designed to have no long term adverse effects and would provide long term beneficial effects to bull trout or their critical habitat.

Topics and Issues Addressed in This Analysis

Purpose and Need

Purposed and need for the project is to reduce hazardous fuel loading within the project area to provide protection for the wildland interface areas associated with private inholdings within the project area, harvest wood products to sustain local and regional economies, and improve forest health and resiliency in concurrence with desired conditions and objectives identified in forest plan.

Issues Addressed

Roads in riparian habitat conservation areas (RHCA) can negatively affect aquatic systems by delivering road related sediment to streams through ditch-lines. Culvert and road fill failures at stream crossings can also contribute substantial amounts of sediment to streams. It can take decades for this material to be flushed out of the channel through normal stream flows. Negative effects to aquatic species from excess sediment can also extend over this time.

Resource Indicators and Measures

Cobble embeddedness (CE) is an indicator of habitat health. As the CE percentage increases in a stream, the ability of fish to use the stream for spawning or rearing decreases. The fine sediments will settle to the substrate and will cause a lack of gravel sorting in the stream beds. Another issue with high CE is it limits and reduces macro invertebrate development which can have implication on nutrient cycling and the food web. There are three levels of habitat functionality based on CE. High functioning systems are below 20% CE, moderately functioning systems are between 20-30%, and low functioning systems have a CE of over 30%.

Roads in RHCAs have the greatest risk of sediment delivery to streams due to the proximity of ditch lines and culverts to streams. Roads outside of RHCAs are rarely connected to streams. Road surfaces erode with use, especially during wet periods of the year. Sediment often runs from the road surface into ditches which flow directly into streams, which can directly affect habitat quality. Other road sediment sources are stream crossing culverts that can plug and fail, adding very large amounts of sediments to streams. Culverts can also act as barriers to upstream fish migration if not properly designed. The following resource indicators are used to analyze the proposed road-related activities:

-*Resource Indicator:* Cobble Embeddedness
-*Measure:* Percent Substrate
-*Resource Indicator*: RHCA road density
-*Measure*: RHCA road miles/RHCA square miles

Resources not Analyzed in Detail

Brook Trout are present in the project area. Due to their status as a non-native introduced invasive species, they will not be analyzed in this report (Rieman et al. 2006; Peterson et al. 2004). Stream crossings and culvert replacements will also not be analyzed in detail but will be mentioned in this report. Water temperature will not be analyzed because there are no thermal barriers in the project area and temperatures fall within normal limits. While Westlope Cutthroat Trout and Resident Rainbow Trout are known to occur in the project area, these species are not relevant to analysis due to their wider range of habitat requirements than bull trout.

Surface fine sediments is measured in percent. Based on the channel type, there are different tolerances of functionality. In the project area, there is only one area that is not in a high functioning category for percent surface fines. Deception Gulch was measured at 28.2%, which a low functioning category based on Deception Gulch being a B channel type. Deception Gulch is a tributary to the North Fork Clearwater River. Given that this is not an area of critical habitat for bull trout, and has no access to anadromous species, percent surface fines will not be analyzed in this report.

Areas with openings greater than 40 acres are not analyzed in this report because the effects of those treatments will not reach the streams to affect the fisheries resource. With the RCHA buffers in place and no treatments taking place within the RCHA, any opening greater than 40 acres will have no effects.

Methodology

Road surveys were conducted on a large portion of the roads to assess culvert conditions and potential drainage needs as they relate to sediment delivery. Google Earth and ArcGIS were used to assess general landscape conditions and to summarize road and stream mile information. The existing condition for aquatics used watershed summary and fish information taken from previously conducted surveys. Cobble embeddedness sampling was conducted on most fish bearing streams in 2017 to assess existing conditions related to the Forest Plan fishery/water quality objectives.

Information Sources

All the information described below is used together to define the condition of aquatic resources and to help predict how proposed activities may affect them. Throughout the analysis, monitoring and peer reviewed scientific literature are used to support the assessment of existing conditions and to support predictions of project effects. Monitoring data and scientific literature are drawn from subject areas including fisheries science, forest and road hydrology, fire and aquatic ecology. Some key information sources are summarized below.

-Spatial data including watershed boundaries, roads, streams, culverts, and fish distribution
-Field data including stream and fish distribution surveys, stream habitat assessment (need citations from Clearwater Biostudies survey reports), and road surveys
-Spatial data on proposed activities such as temporary road construction, new permanent road construction, timber harvest, fuel treatment, and road work

Spatial and Temporal Context for Effects Analysis

Direct/Indirect/Cumulative Effects Boundaries

Spatial Boundaries

The direct, indirect, and cumulative effects analyses are conducted at the sub-watershed scale (6th level hydrologic unit code; HUC 12). This ensures that the potential effects of the proposed activities are

analyzed at the scale small enough to capture the effects but not so large as to dilute them to the point where they would not be measurable.

The Dead Laundry project area is 40,565 acres in size, and is located within the following 4 sub-watersheds: Lake Creek Elizabeth Creek-North Fork Clearwater River Osier Creek and Deadwood Creek-Moose Creek (Figure 1).

The proposed treatments for the Dead Laundry project are as follows;

- 3,837 acres of commercial timber harvest (regeneration or intermediate) 10% of the project area
- 1,350 acres of landscape fuels treatment (landscape burning) and 640 acres of non-commercial fuels treatment (mechanical hand) 3% of the project area
- 196 acres of old-growth enhancement 0.4% of the project area
- 51 miles of road maintenance 21% of total road mileage
- 99 miles of road reconstruction 42% of total road mileage
- 14 miles of new road construction (12.5 miles on previously decommissioned roads and 1.5 miles of newly disturbed ground) 6% increase from initial mileage
- 54 miles of temporary roads (Will be decommissioned upon project completion)

Temporal Boundaries

Direct and indirect effects are assessed from the project implementation initiation through to project completion. Cumulative effects are assessed from project initiation, project completion, and current conditions. Harvest and road work activities would occur within three to four years of project implementation. Prescribed fire activities could occur up to 10 years after project implementation. Potential effects water quality and habitat would be three to five years due the rapid re-establishment of riparian vegetation which provides ground cover that minimizes runoff and erosion (Serpa, B. 2020).

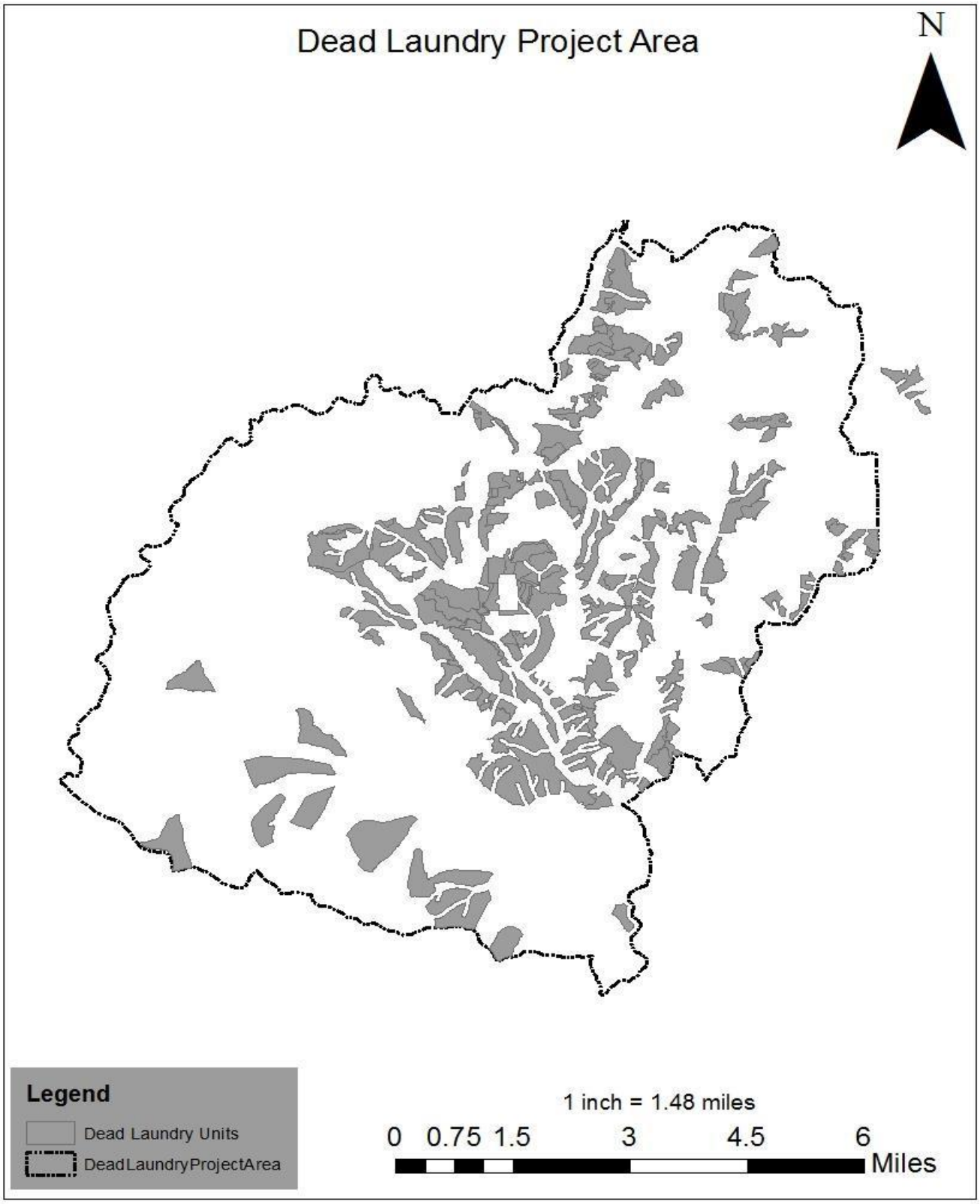

Figure 1. Dead Laundry Project Area

Affected Environment

Existing Condition

Conditions in the project area streams are a result of both natural processes and human activities. Past human related activities include mining, timber harvest, prescribed fire, recreation, road building, and road maintenance.

Aquatic Habitat

Past road construction and timber harvest activities has result in an increase of road miles within RHCAs in the project area. Any removal of streamside trees that may have happened in the past can lead to a reduction in the number and quality of instream pools that provide important rearing habitat for aquatic fish species. The number and quality of habitat will increases over time in RHCAs as young trees age, die, then fall into the streams. Past mining activities can also change stream channel locations and/or morphology in rearing habitat in the project area drainages. These changes can result in disturbed and redistributed instream substrate important for rearing habitat for Bull trout.

Most aquatic habitats on the National Forest portions of the project area recovering from past mining, and timber harvest activities. Roads remaining on the landscape continue to have potential effects on aquatic habitats through sediment delivery to streams. INFISH requirements for riparian management since 1995 have helped to maintain and improve in-stream and riparian conditions on Forest Service lands. Recent road decommissioning and storage efforts, particularly in the Elizabeth Creek sub-watershed, have also led to improved conditions. There has been a total of 112 miles of roads decommissioned. Of the 112 miles, 18 were in RHCAs. Decommissioning roads leads to a decrease in sediment input to area streams, this can lead to improvement of aquatic habitat and a decrease in cobble embeddedness. This can lead to an increase in rearing habitat for bull trout in the project area.

In the project area there are no identified barriers to movement of fish in each of the four HUC12 sub-watersheds. During project implementation while road reconstruction and reconditioning are being conducted, there could be culverts identified as needing replacement. In the event a culvert would need replacement, Mitigation Measures and BMPs will be used to minimize effects from replacement.

Cobble Embeddedness

Cobble embeddedness (CE) in the project area ranges from low functionality to high functionality across the project area. In the Elizabeth/North Fork HUC 12 Sub-watersheds both Deception Gulch and Comet creek are low functioning. Both creeks are also within the project area. In the Lake Creek HUC12 Sub-watershed, Lake creek is moderately functioning while Goose creek is high functioning. However, Goose creek is mostly outside of the project area. Only a portion of the creek at the mouth at the confluence of Lake creek is in the project area. For the Deadwood/Moose HUC 12 Sub-watershed, Deadwood creek and Ruby creek are low functioning. Independence Creek is showing moderate functionality and Moose creek is high functioning. In the Osier HUC 12 Sub-watersheds only Laundry creek is high functioning. Osier, China, Swamp, Pollok, and Sugar creeks are all low functioning streams. It is to be noted that Swamp and Pollock creek are outside of the project area and only a portion of the headwaters of Sugar creek are in the project area. Of the low functioning streams within the project area, Ruby, Osier, and Sugar Creeks are designated as critical Bull Trout habitat. Lake creek is designated as critical Bull Trout habitat and is functioning moderately. Moose creek is the only designated critical habitat for Bull Trout in the project area that is functioning at a high level. (Table 1)

HUC 12 Sub-Watershed	Stream Name and Reach	Survey Year	Cobble Embeddedness (%)	Habitat Elements (NOAA 1998)
Elizabeth/North Fork	Deception Gulch	2019	32.7	Low
	Comet Cr	1995	37.3	Low

Lake	Lake Cr	1990	22.9	Moderate
	Goose Cr *	1990	18.4	High
Deadwood/Moose	Deadwood Cr	2003	32.2	Low
	Moose Cr	2019	17.5	High
	Independence Cr	1990	27.7	Moderate
	Ruby Cr	1998	38.4	Low
Osier	Osier Cr	2019	58	Low
	China Cr	2019	49.8	Low
	Laundry Cr	1994	0	High
	Swamp Cr *	1989	35.8	Low
	Pollock Cr *	1989	30.5	Low
	Sugar Cr	2019	35.9	Low

Table 1. Cobble Embeddedness of surveys streams in project area. (* denotes outside of project area)

Roads

Forests generally have very low average erosion rates unless they are disturbed (Elliot, Hall, & Scheele, 2000). Numerous research studies have documented that forest roads are usually the leading human-caused contributor of sediment to stream channels (Bilby, Sullivan, & Duncan, 1989; Duncan, Bilby, Ward, & Heffner, 1987; Gucinski, Furniss, Ziemer, & Brookes, 2001).

Forest roads can be chronic sources of sediment because road construction, use, and maintenance compact soils, reduce infiltration, intercept, and concentrate surface and subsurface runoff, and limit the growth of vegetation. Road ditches can alter natural drainage patterns and move sediment directly from roads into streams (Wemple et al., 1996). Also, roads can increase the frequency and magnitude of landslides by undercutting the base of unstable slopes; intercepting, diverting, and concentrating runoff to unstable hillsides; and through damage caused by plugged culverts that cause water to overtop the road.

Total Project Area Mileage	Surface Type	Mileage	Percent Total Mileage
235	Native Surface	160	68
	Aggregate	47	20
	Unknown	28	12

Table 2. Road surface type, mileage, and percent of total mileage

There is an important distinction to be made when surface type is concerned. Aggregate gravel roads do not input as much sediment into the system as what native surface roads to. There will not be any log hauling on native surface roads. Any native surface roads that will require log-haul will be resurfaces with aggregate gravel in order to mitigate sediment input to area streams. Prior to this project development, 112 miles of roads in the project area were previously decommissioned.

RHCA Road Density

Road density can provide a relative measure of road-stream interaction and the relative risk for increased sediment input into stream systems. Road density is sometimes used as a surrogate for impacts to streams and watersheds and is related to

reduced fisheries composition and persistence at higher densities. Desired conditions for RHCA road density based on the NOAA Matrix of Pathways and Indicators (NOAA, 1998) are less than 1 mi/mi^2. While roads likely contribute sediment, a review of research in Idaho and elsewhere concluded that non-channelized runoff from roads has a low probability of travelling further than 300 feet (Belt et al., 1992) thus potentially resulting in limited delivery.

There are ~91 miles of gravel or native surface (dirt) roads within RHCAs. Of the 91 miles within the RHCAs there are a total of 37 (41 % of total mileage) miles proposed to be used for log-haul. There is also only 9.2 (10% of total mileage) miles of RHCA road miles that are in the RHCA of designated Bull trout critical habitat streams that are proposed log-haul routes. Included in the 9.2 miles of roads in designated bull trout critical habitat RHCAs, 1.5 (1.6% of total mileage) miles will be reconstructed and transitioned from native surface to aggregate gravel surface in order to minimize the amount of sediment input. The total average RHCA road density across all HUC 12 sub-watershed in the project area are 2.3 mi/mi^2, or a low condition based on the NOAA Matrix of Pathway Indicators. Roads in RHCAs have the potential to add sediment to streams through ditch lines and stream crossings. Each HUC 12 RHCA streamside road density is calculated below (Table 3).

HUC12 Sub-watershed	RHCA Road Miles (mi)	RHCA Streamside Road Density (mi/mi2)	Watershed Condition (NOAA 1998)
Deadwood-Moose Cr	18	2.7	Low
Elizabeth Cr-North Fork Clearwater R	29.7	1.8	Moderate
Lake Cr	18.7	2.9	Low
Osier Cr	24.6	2.6	Low

Table 3. RCHA streamside road density at the HUC12 sub-watershed level

Aquatic Organisms

Special status aquatic species in the project area include Bull Trout (listed as a threatened species under the Endangered Species Act) and Region 1 Sensitive species Westslope Cutthroat Trout, and Redband Trout.

Aquatic Fish Species

Westlope Cutthroat Trout

Snorkel surveys and eDNA results have shown there are Westlope Cutthroat in Lake creek, Elizabeth-North Fork, Deadwood-Moose, and Osier creek sub-watersheds (Figure 2).

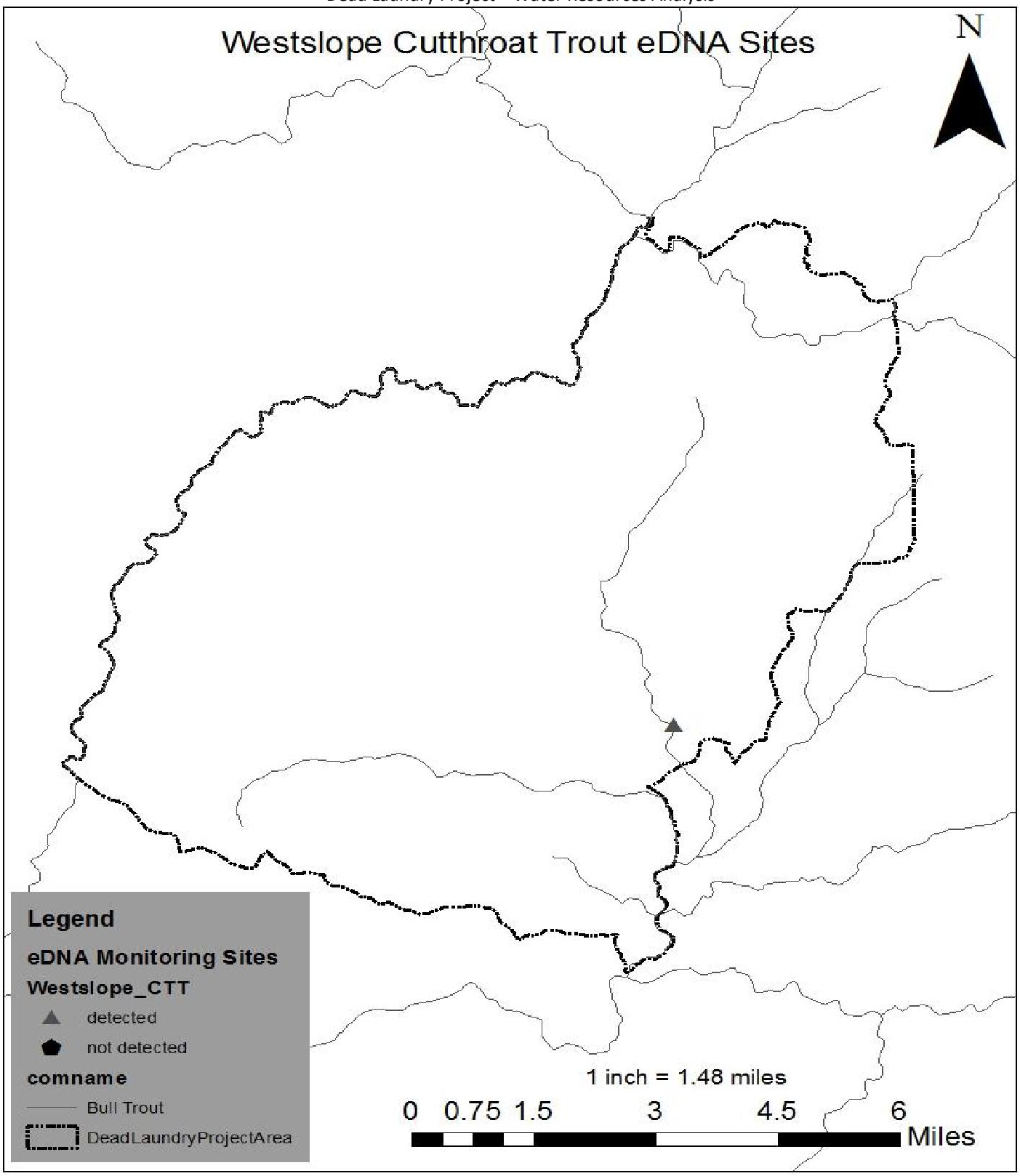

Figure 2. Dead Laundry Westslope Cutthroat Trout eDNA Detection site

Bull Trout

Bull trout were observed in Dead Laundry project area with eDNA and IDFG snorkel surveys (eDNA surveys 2018/2019; Snorkel surveys 2002-2005).

Designated bull trout critical habitat in the Dead Laundry project area includes the mainstem of the NFCR, which is foraging, migration, and overwintering (FMO) habitat; and Ruby, Moose, Sugar, and Lake Creeks and the lower ~0.25 miles of Goose Creek, which are designated as spawning and rearing (SR) habitat (Figure 3).

The USFWS Recovery Plan for bull trout (USFWS 2015) states that there are two local populations in the project area (Figure 3): one in the Lake Creek drainage and one in Moose Creek drainage. Snorkel and eDNA surveys indicate bull trout occur in Moose, Osier, and Swamp Creeks.

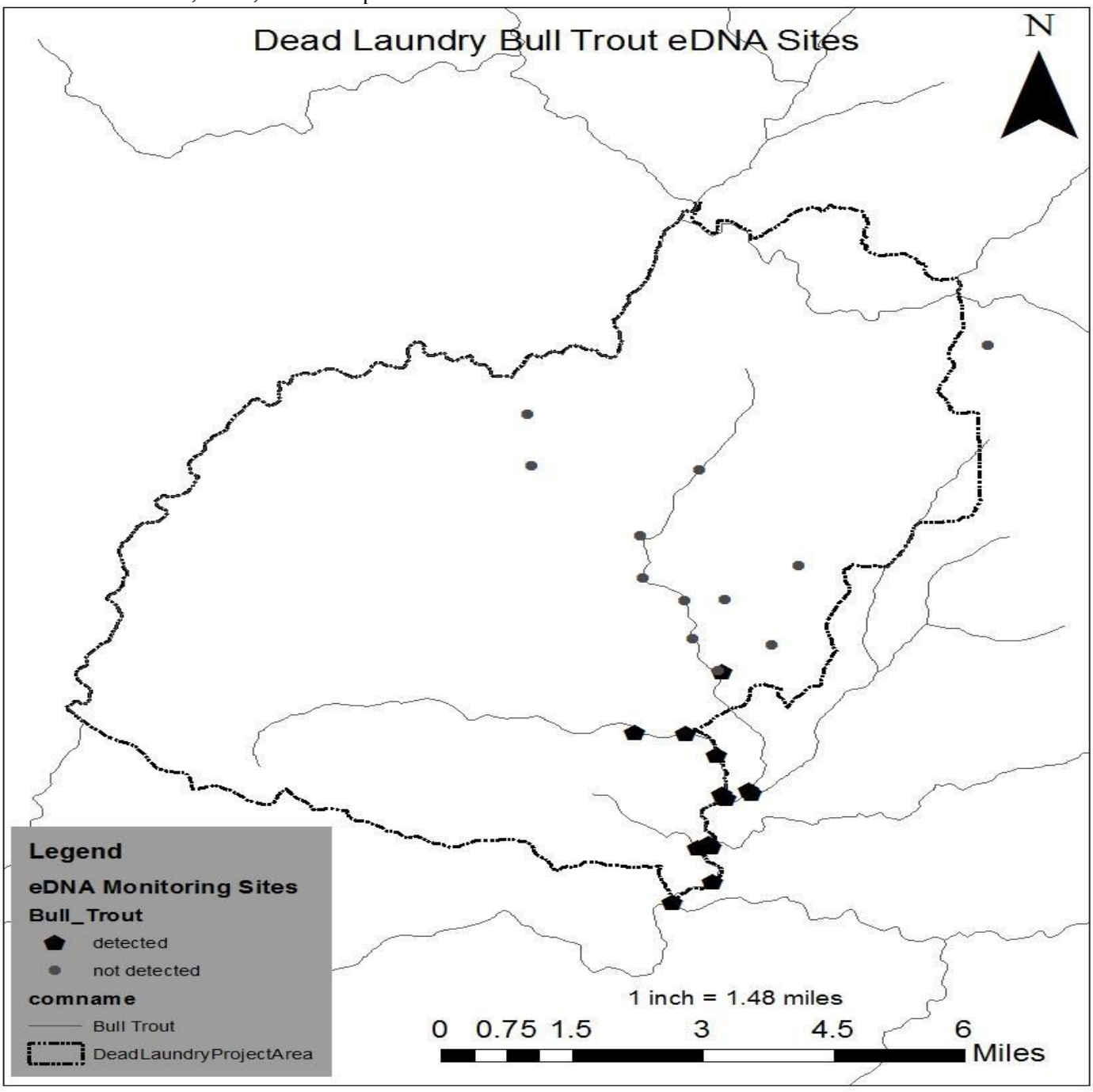

Figure 3. Bull trout critical stream designation and eDNA detections in Dead Laundry project area

Red-Band Trout

Red-band trout (Figure 4) have been observed during surveys in Laundry creek in 1995, Independence creek and Moose creek in 1991. Muhlfield et. al (2015) indicates over 600 fish/km in parts of the project area.

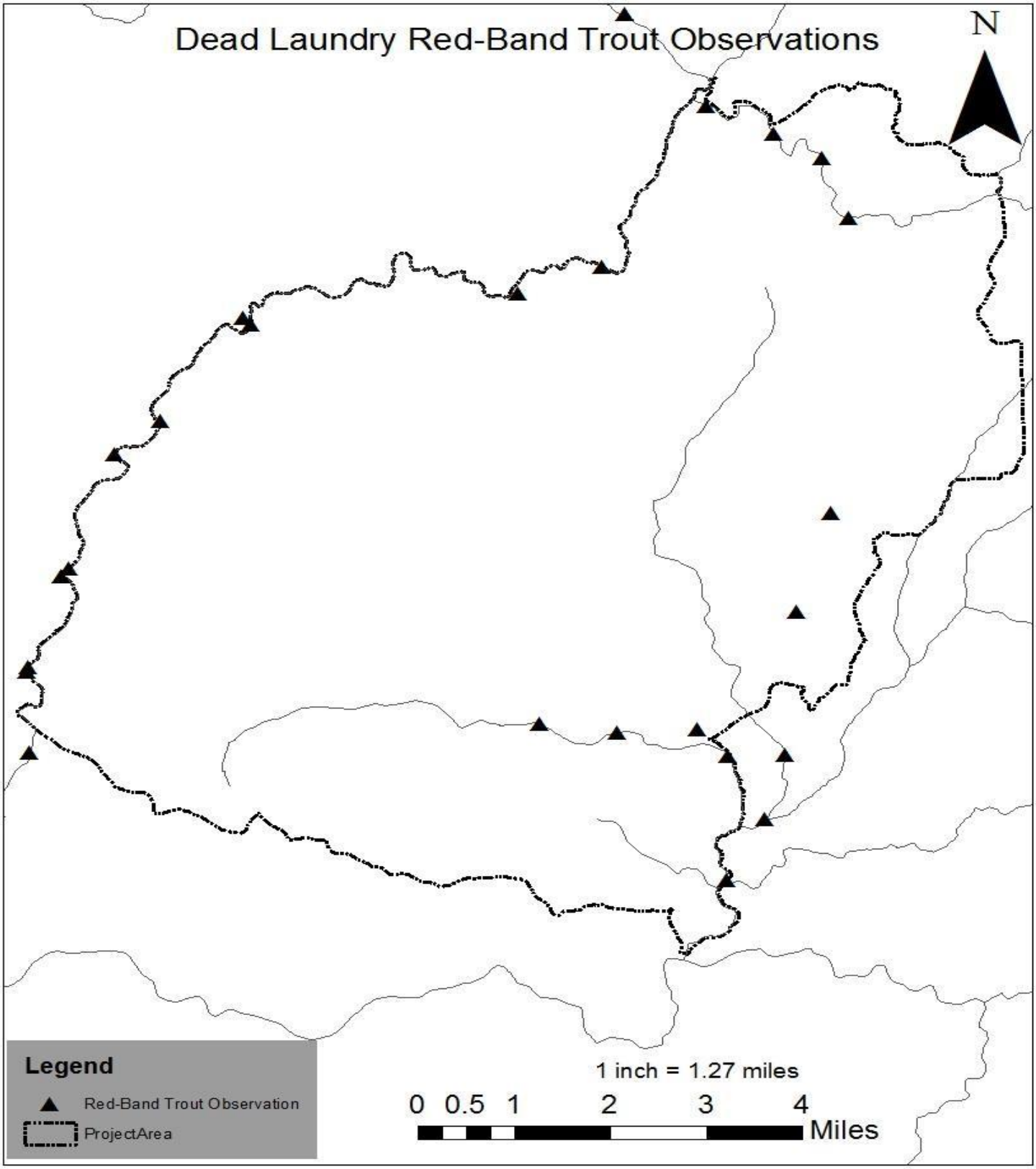

Figure 4. Red-Band trout observations

Environmental Consequences

No Action

No timber harvest, road decommissioning, road reconditioning, or road reconstruction would occur under this alternative. Any road-related watershed improvement activities would require additional NEPA analysis prior to implementation of project work.

Direct Effects

No direct effects to streams would result since no stream channel or streamside areas would be disturbed

Indirect Effects

No decommissioning, reconstruction, or reconditioning of system roads would occur resulting in continued potential sediment delivery to streams. No RHCA road miles would be reconditioned or reconstructed. This could result in the potential blocking of culverts at stream crossings from excessive sediment input clogging the culverts which could impede fish movement that would halt migration to or from spawning and rearing streams, or result in road failures and sediment delivery to streams. RHCA streamside road densities would not change in this alternative. An increase in sediment input could also increase cobble embeddedness. An increase in cobble embeddedness also decreases spawning and rearing habitat for fish.

Though not listed as a resource indicator, there are potential effects to streams in the event of wildfires. They include the risk of stream warming and the risk of landslides and sediment delivery. The current risk for these fire effects would be maintained under this alternative. Natural fire patterns indicate the majority of stand replacing fires occur in headwater areas and along ridges in this fire-prone landscape. Fire-related tree mortality resulted in in a lack of shade over streams which increases the risk of stream warming. Wildfire effects have been shown to increase stream temperatures in 2nd to 4th order streams for more than seven years; however, the effects were not observed more than 1 mile downstream (Mahlum et al, 2011). Where tree mortality is high, landslides can occur as a result of the loss of tree root strength. Landslides can deliver woody material and substrate important for aquatic habitats to streams.

Proposed Action

Project Design Features and Mitigation Measures

Project Design Features (PDFs) are intended to avoid specific resource issues. Some of these are derived from site specific Best Management Practices (BMPs) from the Idaho Forest Practices Act and Stream Channel Alteration Handbook, with comparable practices from the FS R1/R4 Soil and Water Conservation Practices Handbook (FSH 2509.22), while others are tailored to local conditions and issues.

PACFISH Buffers (RHCAs): All management activities since 1995 implemented RHCAs in order to eliminate or reduce impacts to riparian areas and streams. Various field reviews and monitoring activities support the conclusion that stream habitat conditions have improved since the Forest Plan was written in 1987. Much of the recovery is a result of less land disturbing activities, better application of BMPs, RHCA retention, and better road design (USDA, 2009; pg. 91). Preliminary monitoring results from the PACFISH/INFISH Biological Opinion (PIBO) monitoring across the Upper Columbia River Basin overall indicate an improving trend in residual pool depth, wood frequency, bank stability, and undercut banks at managed and unmanaged sites between 2001 and 2012 (USDA, 2012). A decreasing trend in pool percent and D50 (median substrate grain size) were observed in both managed and unmanaged sites. There was an increasing trend in percent fines at unmanaged sites and no significant trend at managed sites.

Further evidence showing the effectiveness of buffers to minimize or eliminate sediment form timber harvest activities can be found in a long-term study by Hatten et al (2017). The study was conducted in the Alsea watershed in Oregon where timber harvest occurred with no buffers and extensive stream

disturbance in the 1960s. The sites were revisited, and harvest conducted using contemporary harvesting techniques from 2009 through 2015. The study found no evidence that contemporary harvesting

techniques affected suspended sediment concentrations or yield. Overall, suspended sediment concentrations and yield were similar to historical pre-treatment levels. Retained streamside buffers on fish bearing streams were 50' wide in the study which are significantly less in size than RHCAs. No buffers were retained on non-fish bearing streams. This and other studies (Cristan et al, 2016; Sweeney and Newbold, 2014) supports the effectiveness of buffers in reducing or preventing sediment delivery to streams.

No-harvest buffers of 100'- 150' have also been shown to be adequate in protecting the riparian vegetation necessary to maintain natural stream temperature regimes (Ott et al 2003; Lee et al 2004; Sridhar 2004; FEMAT 1993).

Best Management Practices (BMPs): BMPs are applied to forest management activities as stipulated by the Idaho Forest Practices Act and the Idaho water quality standards. Idaho State Water Quality BMP monitoring indicates BMP compliance rates across all ownerships (federal, state, private industrial, private non-industrial) at 96% or higher (IDEQ 2016 and 2013). This has been an improvement since 1984 when compliance was 82%. Compliance has been over 96% since 1996. Harvest and stream protection rules had a 98% compliance rate in 2016. The Clearwater National Forest has completed its own BMP audits since 1990 and has an excellent record of successful implementation of BMPs since 1990. The Forest has BMP implementation and effectiveness rates of 97% or better since 1990 (USDA, 2008; Snyder, 2017). The same BMPs would be applied to the Dead Laundry Project and are expected to have similar results.

Design features would be used to minimize direct input of sediment to streams from management activities. RHCAs would be retained on perennial and intermittent streams adjacent to timber harvest units. Road reconstruction would install cross-drain culverts where needed to divert roadside ditch flow away from streams. Road surfacing with gravel and dust abatement would also occur where needed to minimize sediment production and delivery. There will be a 3/32-inch screen placed on intake pipe for any water drafting for dust abatement. Trail improvement work would also occur in order to reduce trail related erosion. Road decommissioning would remove all perennial and intermittent stream channel crossings and would recontour roads within RHCAs.

Direct and Indirect Effects

Proposed action alternatives that could affect fisheries resources include, but not limited to commercial harvest; non-commercial fuels thinning; landscape prescribed burning; prescribed burning of activity fuels; new temporary road construction; road reconstruction on existing road templates; new system road construction, and existing system road maintenance and reconstruction.

No direct effects are expected to occur to fish or their habitat from commercial harvest due to RHCA retention, other design features, and BMP implementation. Streams would not be physically disturbed during commercial harvest.

Landscape prescribed burning; prescribed burning of activity fuels would have no direct effects to fish or their habitat because no ignition is to occur within RHCAs and burning would take several years to accomplish.

A small amount of non-commercial hand-felling would occur within RHCAs as part of the fuel reduction treatments, following specific limitations: No heavy equipment would operate within the RHCA. Only hand work using chainsaws, pruning poles, and other hand tools would be accomplished, with sub-merchantable trees (less than 5 inches DBH) and brush vegetation creating surface and ladder fuel being targeted; Treatment would be limited to slopes of 50% or less; No treatment would be applied within 25ft of perennial, or 15ft of intermittent stream channels (or stream terrace, whichever comes first), and 10ft of wetlands less than one acre; Hand piles would be placed no closer than 50ft of perennial, and 25ft of intermittent streams and would be limited to 8ft in diameter and 25ft apart. Material greater than 4 inches diameter would not be included in piles but would be left on site as course woody debris; Apart from the limited hand piles, there would be no direct ignition within 50 feet of waterbodies/stream channels. Fuel reduction activities would not alter riparian canopy cover conditions.

RHCA Road Recondition/Reconstruction

The proposed road activities (Figure 5) will have direct and indirect effects on fish and their habitat. The proposed action would result in a total of 0.7 miles of new temporary road and 2.5 miles of existing temporary roads within RHCAs, for a total of 3.2 miles of temporary road within RHCAs which would be decommissioned upon project completion. New construction would result in 0.7 miles of roads in RHCAs and would cross one tributary of moose creek. There will be a total of 25 miles of reconditioning within RHCA. There will also be a total of 21 miles of reconstruction in the RHCAs in the project area. This results in a total of 46.7 miles of roads within the RHCAs in the project area upon completion of project activities.

The direct effects of road reconditioning and reconstruction come from the direct input from the maintenance activities. These direct effects of sediment delivery from these activities are minimized from BMPs and Design Features (Arismedni et al. 2017; Cristan et al. 2016; Edwards et al. 2016; Ice et al. 2004; Seyedbagheri, 1996; Sugden, 2018; Warrington et al. 2017).

Minimizing sediment delivery from road maintenance activities reduces the indirect effects on aquatic environments by keeping effects downstream from activities at a minimum.

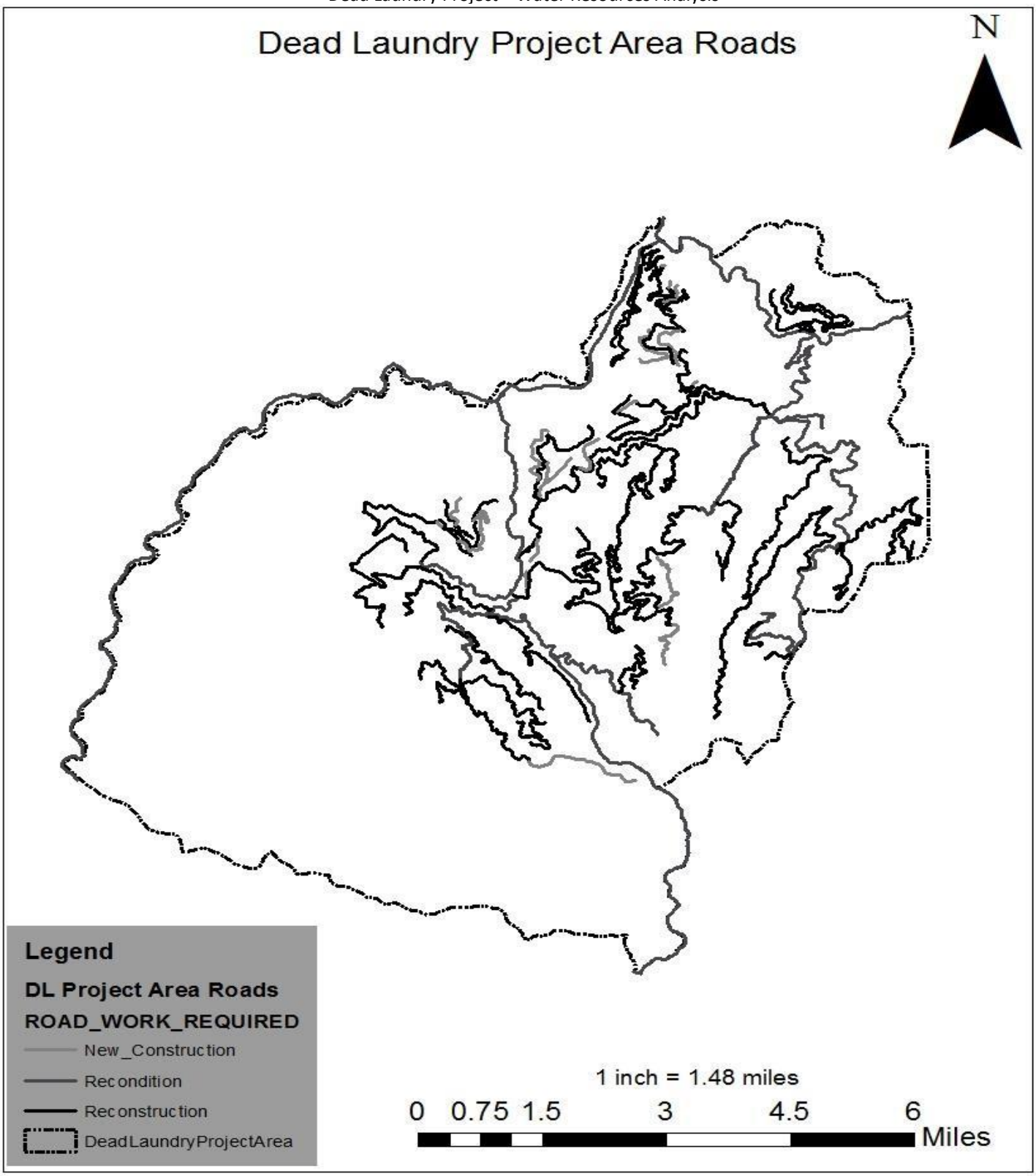

Figure 5. Dead Laundry proposed road work

Summary

All Dead Laundry project activities should maintain or improve water quality; therefore, the Dead Laundry project is designed to produce no measurable increase in sediment from road segments in RHCAs. GRAIP_Lite modeling shows an

overall reduction in sediment deliver from current condition to recovered condition (Serpa 2020). The effects of temporary road construction to aquatic habitat would be minimal du to the limited hydrologic connection to streams and the short time of the temporary road's existence on the landscape. With the implementation of required design features, these temporary roads will be constructed to minimize sediment deliver int eh same way as new permanent road. Best management practices would be used to provide proper drainage and prevent excessive erosion and suspending construction and haul during wet conditions. Within three years of the project completion, temporary roads would be rendered stable through recontouring/obliteration. System roads used to access treatment units would be maintained, reconditioned, or reconstructed to improve road drainage and reduce sediment delivery to streams. Stream crossings would combine ditch relief culverts and drivable dips and graveling the driving surface over crossing to reduce sediment delivery to the stream. Failing and severely undersized stream crossing culverts would be replaced with culverts meeting criteria described in design features to reduce long-term chronic sediment delivery and risk of road fill failures (Serpa 2020). These culverts identified as having a need for replacement will be identified and replaced using the Stream crossing Programmatic

The new road construction proposed that would have 0.7 miles within RHCAs, crosses one small, headwater stream that is a tributary to moose creek. The crossing is ~2,176 feet up stream from its confluence with Moose creek. This is an important distance to note because when sediment leaves a road, the greatest impact to water quality is immediately below where it enters a stream. Effects decrease quickly within several hundred feet and return to near-background levels within ½ mile, even without mitigation (Foltz, Yanosek & Brown, 2009). With mitigation measures, I assume that the distance for back-ground levels of sediment to be reached would decrease from the ½ mile, and would end up reaching back-ground levels well within the over 2,000 foot distance from the crossing with the upstream tributary to the convergence of Moose creek.

The actions of the project would improve 46.7 miles of RCHA road miles through reconstruction and reconditions. The actions will gravel stream crossings, stabilize existing roads, replace culverts, spot-rock replacement, and reshape drainage ditches (Table 4).

HUC12 Sub-watershed	RHCA Road Miles	Recondition RHCA Road Miles	Reconstruction RHCA Road Miles	Amount of RHCA Road Miles Improved
Deadwood-Moose Creek	18	7.7	5.3	13
Elizabeth Creek-North Fork Clearwater River	29.7	9.8	3	12.8
Lake Creek	18.7	6.2	0.7	6.9
Osier Creek	24.6	2	12	14

Table 4. RHCA road miles improved

Instream activities associated with culvert replacement would introduce locally measurable amounts of sediment immediately downstream of the replacement sites. Up to 20 pounds of sediment could be added at each replacement site (Foltz et al. 2008). If all 15 of the of the culverts that were marked as concerns were replaced, that would roughly be 300 pounds (0.15 tons) of sediment delivered to streams. That would not be a measurable increase given the sites are disturbed throughout the project area, and only one site is on a fish bearing stream. Also, part of the design features of culvert replacements require sediment filtering devices below the work area would minimize sediment delivery.

Log-haul is not expected to contribute to measurable increases in instream sediment as a result of gravel surfacing and dust abatement. Arismendi et al (2017) found no significant increase in median suspended sediment or turbidity downstream compared to upstream of road crossings where road reconstruction and log-haul occurred. Foltz (2008) showed that the use of high-quality aggregate (gravel) produced 3 to 17 times less sediment than marginal quality aggregate. The basalt aggregate used for project roads is composed of basalt which is considered high quality as it does not easily break down into smaller, dust forming particles. In addition, dust abatement would minimize the amount of road related sediment added to streams. Sanders and Addo (1993) showed that abatement produced half the amount or less of

dust as untreated graveled roads. They also showed that traffic speeds affect the amount of dust produced. Slower traffic speeds (20 -30 mph) produce half as much dust as higher speeds (40+ mph). Log-haul traffic speed is not expected to exceed 30 mph and would be closer to 20 mph due to the narrow, twisty road network in the project area. When combined with road improvement activities, log-haul is not expected to add measurable amounts of sediment to project area streams.

In summary, increases in sediment delivery during project implementation are expected to increase with road maintenance, graveling stream crossings, replacing culverts, and spot-rock treatments. However, with design feature and BMP implementation, the effects from these sediment delivery increases will be minimized and decrease over time after the project has been completed, all temporary roads have been obliterated, and all roads scheduled for decommission are completed.

Cumulative Effects

Cumulative effects are those which would be realized if the effects of the Forest Service project's proposed action(s) are added to the effects of past, present, and reasonably foreseeable future actions.

No Action Alternative

The cumulative effects of the No Action Alternative could adversely impact many aquatic populations in the project area. This alternative would allow continued vegetation conversion outside of Forest Plan desired conditions, insect and disease prevalence, and accumulation of surface and ladder fuels. Lessened canopy cover and associated stream warming would negatively impact the fitness of many species in the project area. A severe wildfire event and/or lack of culvert functionality could also introduce larger volumes of sediment into the streams, which negatively impact the spawning success of fish such as bull trout. A lack of culvert functionality could also lead to failure, which could cause migration and movement barriers. A larger volume of sediment input into the stream system could increase cobble embeddedness which decreases spawning habitat for fish. Landslides from severe fires have the potential to drastically change a stream's functionality. The cumulative effects of the No Action Alternative could cause effects to local populations of aquatic species for decades to come.

Alternative-Proposed Action

The proposed action is designed to protect fish and fish habitat using Riparian Habitat Conservation Areas (RHCA), Design Features (DF), and Best Management Practices (BMP). The impacts of new of temporary roads would be decreased by avoiding locations near streams when possible, using the BMP to limit erosion and sediment deliver, and recontouring or obliterating after use. The effects of new permanent roads would be minimized by using BMP and DF to limit erosion and sediment delivery. Road maintenance, reconditioning, and reconstruction activities would reduce sediment delivery to streams in the long term by improving driving surfaces, reshaping drainages, and disconnecting roadways from streams.

The proposed action would increase RHCA road density during project implementation, however, in the long term, the increase in RHCA road density would decrease because the increase comes from 3.2 miles of temporary roads within RHCA that would be decommissioned upon project completion.

Suction dredge mining is the only activity assessed for cumulative effects. Up to three ongoing small-scale suction dredge mining operations and their associated activities take place on private inholdings along 2.5 miles of Moose and Independence Creeks. These activities will have minimal to nominal input due to BMPs and Design features for suction dredge mining.

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APPENDIX A.

Design Features

☒ PACFISH/INFISH - Where catastrophic events such as fire, flooding, volcanic, wind, or insect damage result in degraded riparian conditions, allow salvage and fuelwood cutting in Riparian Habitat Conservation Areas only where present and future woody debris needs are met, where cutting would not retard or prevent attainment of other Riparian Management Objectives, and where adverse effects on listed anadromous fish can be avoided. For watersheds with listed salmon or designated critical habitat, complete Watershed Analysis prior to salvage cutting in RHCAs. ***NP Forest Plan – Amendment 20; CLW Forest Plan – Amendment 10***

☒ PACFISH/INFISH - Apply silvicultural practices for Riparian Habitat Conservation Areas to acquire desired vegetation characteristics where needed to attain Riparian Management Objectives. Apply silvicultural practices in a manner that does not retard attainment of Riparian Management Objectives and that avoids adverse effects on listed anadromous fish. Including:

- No timber harvest is to occur within 300 feet of fish-bearing streams, 150 feet of perennial non-fish bearing water, 150-foot slope distance from the edge of Ponds, lakes, reservoirs, and wetlands greater than 1 acre, and 100-foot slope distance from seasonally flowing or intermittent streams, wetlands less than 1 acre, landslides, and landslide-prone areas.
- Interim RHCA widths may be increased where necessary to achieve riparian management goals and objectives, or decreased where interim widths are not needed to attain RMOs or avoid adverse effects to listed salmon. Generally, RHCA modifications will require completion of Watershed Analysis to provide the ecological basis for the change. However, RHCAs may be modified in the absence of Watershed Analysis where stream reach or site-specific data support the change. In all cases, RHCA modifications, the rationale supporting those changes, and the effects of the changes will be documented. Within the range of listed salmon, modification of RHCAs will be done in consultation with NMFS. ***NP Forest Plan – Amendment 20; CLW Forest Plan – Amendment 10***

☒ PACFISH/INFISH – Roads Management: For each existing or planned road, meet the Riparian Management Objectives and avoid adverse effects on listed anadromous fish by:

- Completing Watershed Analyses prior to construction of new roads or landings in Riparian Habitat Conservation Areas.
- Minimizing road and landing locations in Riparian Habitat Conservation Areas.

- Initiating development and implementation of a Road Management Plan or a Transportation Management Plan. At a minimum, address the following items in the plan:
  - Road design criteria, elements, and standards that govern construction and reconstruction.
  - Road management objectives for each road.
  - Criteria that govern road operation, maintenance, and management.
  - Requirements for pre-, during-, and post-storm inspections and maintenance.
  - Regulation of traffic during wet periods to minimize erosion and sediment delivery and accomplish other objectives.
  - Implementation and effectiveness monitoring plans for road stability, drainage, and erosion control.
  - Mitigation plans for road failures.
- Avoiding sediment delivery to streams from the road surface.
  - Out-sloping of the roadway surface is preferred, except in cases where out-sloping would increase sediment delivery to streams or where out-sloping is infeasible or unsafe.
  - Route road drainage away from potentially unstable stream channels, fills, and hillslopes.
- Avoiding disruption of natural hydrologic flow paths
- Avoiding side-casting of soils or snow. Side-casting of road material is prohibited on road segments within or abutting RHCAs in watersheds containing designated critical habitat for listed anadromous fish. ***NP Forest Plan – Amendment 20; CLW Forest Plan – Amendment 10***

☒ PACFISH/INFISH – Roads Management: Construct new, and improve existing, culverts, bridges, and other stream crossings to accommodate a 100-year flood, including associated bedload and debris, where those improvements would/do pose a substantial risk to riparian conditions. Substantial risk improvements include those that do not meet design and maintenance criteria, or that retard attainment of Riparian Management Objectives, or that do not protect designated critical habitat from increased sedimentation. Base priority for upgrading on risks to listed anadromous fish and their designated critical habitat and the ecological value of the riparian resources affected. Construct and maintain crossings to prevent diversion of streamflow out of the channel and down the road in the event of failure. ***NP Forest Plan – Amendment 20; CLW Forest Plan – Amendment 10***

☒ During road work (construction, re-construction, maintenance, decommissioning, or long-term storage) activities, measures are to be taken to prevent or minimize sediment from entering streams during project activities and in the long-term, such as: (a) placing removable sediment traps below work areas to trap fines; (b) when working instream, removing all fill around pipes prior to bypass and pipe removal (where this is not possible, use non-eroding diversion); (c) revegetating scarified and disturbed soils with grasses (weed free) for short-term erosion protection and with shrubs and trees for long-term soil stability; (d) mulching with native materials, where available, or using weed-free straw to ensure coverage of exposed soils; (e) dissipating energy in the newly constructed stream channels using log or rock weirs; and (f) armoring channel banks and dissipating energy with large rock whenever possible. **Applies to projects using *Idaho Stream Crossing 10-year Programmatic BiOp***

☒ Design prescribed burn projects and prescriptions to contribute to the attainment of the Riparian Management Objectives. ***Fire/Fuels Programmatic BA for Nez Perce – Clearwater Forests; NP Forest Plan – Amendment 20; CLW Forest Plan – Amendment 10***

☒ The Purchaser/Contractor shall take all reasonable precautions to prevent possibility of fuel spills. ***Idaho Stream Crossing 10-year Programmatic BiOp; Mandatory Contract Provisions***

☒ WATER QUALITY - The Forest(s) will use best management practices to control pollutant sources under their jurisdiction. The Forest(s) Plans require that most projects watershed improvements associated with the projects. Most of the best management practices contain both sediment source reduction and shade improvement. **South Fork Clearwater River TMDL Implementation Plan; Lolo Creek Tributaries Subbasin Assessment TMDL; Lochsa River Subbasin Temperature TMDL**

Mitigation Measures

	FISHERIES	

☒	FF-1	In the event instream activities are needed during project implementation on Road(s) *250,255,295,737,5435,5437-D,74502*, allow instream activities in fish bearing streams between (*August 15*) and (*September 15*). These dates may be site-specifically adjusted through coordination with Central Idaho Level 1 team review and approval. **Only required if ESA listed fish are near a project site where they may be affected.* T*he dates are dependent on the ESA species present and can vary by species.*	Implemented through Contract Provisions **Effectiveness:** High, based on experience and local monitoring.
☒	FF-2	Avoid direct ignition of fuels within RHCAs, unless needed to meet safety, control, or protection objectives.	Implemented through Forest Service action **Effectiveness:** High, based on experience and local monitoring.
☒	FF-3	All reconstructed and temporary constructed road segments within RHCAs would be graveled 100ft. on either side of the crossing upon completion of reconstruction/construction	Implemented through Mandatory and other Contract Provisions **Effectiveness:** High, based on experience and scientific monitoring.

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